ANALYSIS OF MATEMATICAL REPRESENTATION ABILITIES OF STUDENTS IN SOLVING STORY PROBLEMS ON SYSTEM OF LINEAR EQUATIONS WITH TWO VARIABLES (SPLDV) IN CLASS VIII MTs. SWASTA AL-ITTIHAD AEK-NABARA

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Article Info	Abstract
	Low mathematical representation ability can affect the way students understand the mathematical problems faced and affect how to solve these problems. This study aims to determine the mathematical reprentation ability of students in class VIII MTs. Swasta Al-Ittihas Aek-Nabara. The research subjects were students of MTs. Swasta Al-Ittihas Aek-Nabara and the sample used amounted to 25 students. The method applied in this research is descriptive qualitative with tests and documentation as a research data collection technique. Data analysis techniques used in the study consisted of data reduction, data presentation and conclusion drawing. The results showed that the mathematical representation ability of class VIII students in the school on the material of the system of linear equations of two variables was in the low category **Keywords:** The mathematical representation ability; story problem; system of linear equations of two variables

1. Introduction

One of the most important human needs for human survival is education. Human need for human survival is education. To improve the quality of life and make us more devout, education is always needed by us. In order to improve us more, education is always needed by us. Education is the process of guiding children towards our educational goals. Appreciate from guiding children towards educational goals that we value (Matematika, 2018).

In Indonesia, mathematics education at the junior high school (SMP) level is crucial, because this is where students begin to learn more complex and applicable concepts. Mathematics learning in junior high school focuses not only on mastering formulas, but also on deep understanding of concepts. However, many students experience difficulties in understanding basic concepts, thus affecting their ability to solve more complex problems at a higher level (Agustyaningrum & Pradanti, 2022).

Mathematics is one of the subjects that has an important role in education around the world. As the basis of various disciplines, an understanding of mathematical concepts is needed, not only to solve mathematical problems but also to improve logical and analytical thinking skills. This subject provides a foundation for students to understand various phenomena that occur around them, as well as help them in facing challenges in various fields in the future (Rivai & Rahmat, 2023)

One of the materials taught in junior high school, especially in class VIII, is the System of Linear Equations of Two Variables (SPLDV). However, based on initial observations at MTs. Private Al-Ittihad Aek-Nabara, it appears that students still have difficulty solving story problems related to SPLDV. This can be caused by many things, such as lack of experience solving story problems, difficulty converting everyday problems to mathematical models, or lack of understanding of concepts. Students can show their mathematics in various forms such as pictures, symbols, words or verbal.

Because learning mathematics requires students to make connections between the different material they are studying, the material they are studying and represent the division of ideas or thoughts they have encountered with great effort, the ability to represent mathematics is one of the important elements for students to have in order to develop their thinking abilities and to represent the ability to share ideas or thoughts that they have encountered with great effort, mathematical representation ability is one of the important elements for students to have in order to develop their thinking abilities (Muthianisa et al., 2022).

Mathematical representation ability can be categorized into three forms of representation, namely verbal, pictorial, and symbolic. These are external representations. These three types of representation have been explained by Villegas in his research: 1) Verbal representation, which consists of statements explained verbally or in writing about the given problem; 2) Pictorial representations, which can be pictures, tables or graphs; and 3) Symbolic representation, which can be in the form of mathematical symbols, models or equations (Mulyaningsih et al., 2020).

Mathematical representation skills are very important in learning mathematics, but many teachers ignore this ability. Having good mathematical representation skills will help students understand the concepts being studied. The results of Hudiono's preliminary study show that teachers only use mathematical representations in the form of graphs, tables, and pictures as a complement to the lesson and rarely pay attention to the development of students' representation skills. This shows that teachers pay less attention to students' representation skills when teaching mathematics. As a result, students' representation skills are lacking (Khoerunnisa & Maryati, 2022).

The importance of mathematical representation skills requires students to: (1) create and use representations to organize, record, and communicate mathematical ideas, (2) select, apply, and

translate mathematical representations to solve problems, (3) use representations to model and interpret physical, social, and mathematical phenomena. Thus, mathematical representation skills are needed by students to find and create a tool or way of thinking in communicating mathematical ideas from abstract to concrete, making it easier to understand (Komala & Afrida, 2020).

Jones states that there are two reasons why mathematical representation is very important for students, namely : 1) the ability to apply translation between different forms of representation and teach the basic skills needed by students to build concepts and think mathematically; 2) the way the teacher conveys concepts through various representation will have a significant impact (Muthianisa et al., 2022).

However, some studies show that many students have difficulty in representing story problems into the right mathematical form. This difficulty can be caused by several factors, such as lack of understanding of concepts, low reading skills, or lack of experience in solving story problems. The results showed that the low achievement of the study results was due to the ability of students in Indonesia to find solutions or find alternative answers to problems still focused on one way or presentation where students mostly use symbolic representation forms when solving a problem (Studi et al., 2022).

 Two success factors for achieving good results are as follows:

1. The intelligence factor is often referred to as one's innate intelligence, specifically one's ability to adapt to situations.
2. The motivation factor. Motivation is very important. It produces a strong drive, a strong desire, and a tendency to solve problems immediately.

Story questions are important because they are usually used to assess students' problem solving skills because they are usually used to assesss students' problem solving skills. Compared to mathematics problems that directly demonstrate mathematical models, story problems are seen to be more challenging to mathematics problems that directly demonstrate mathematical models, story problems are seen to be more challenging. Supposed to be able to identify issues that need to be resolved in tale situations (Dwidarti et al., 2019).

Mathematics story problems play a very important role in students' daily lives because these problems emphasize problems that are in accordance with everyday life. Story problems are a form of evaluating students' abilities to the basic concepts of mathematics that have been learned. This shows how important mathematical representation is in learning mathematics, especially in solving story problems. Students who solve story problems not only have to get results in the form of answers to the questions asked; what is more important is that students must understand the thought process used to solve problems and find answers (Wahyuddin, 2016).

In everyday life, there are often real math problems that are arranged in the form of story problems. This shows how important mathematical representation skills are in learning mathematics, especially in solving story problems. Students must understand the thought process used to solve the problem, not just get the answer to the question. To solve story problems, there are four (4) steps that must be followed: (1) understand the math problem, which includes determining what is

asked and known in the problem, (2) create a mathematical model, (3) solve the mathematical model (perform calculations), (4) determine the final answer, or conclusion.

Muncarno said that students' difficulties in learning a story were caused by the students' inability to pay attention and understand the lesson material, what was understood and what was asked, as well as how to explain the lesson material well (Dwidarti et al., 2019).

According to widiharto the inability to remember one or more terms of a concept is a sign of mathematical difficulty. This shows that students still have difficulty understanding mathematics material. The cause of these difficulties is because students do not understand the concept. Students not only face difficulties, but they also experience errors when solving questions. Some common mistakes include not understanding symbols, not understanding locations, calculations, using incorrect processes, and illegible writing (Dwidarti et al., 2019).

The system of linear equations of two variables (SPLDV) belongs to the equations that are divided into two linear equations, with two variables each. With respect to the general form of SPLDV, the following formula applies: $ax + by = c$ with $a, b \neq 0$. Three methods of graphing, substitution, elimination and combination are used to make determinations in solving and rooting SPLDV. SPLDV is a material that must be taught in junior and senior high schools (Muthianisa et al., 2022). By continuing to encourage students to try harger to learn and pushing them until their mindset of not liking mathematics becomes one of liking it, we can reduce their difficulty in solving mathematical problems related to the material on systems of linear equations in two variables (Taufiq, 2022)

2. Methods

Place and Time of

This research is a type of qualitative research and sugiyono stated that because qualitative research is often reffered to as a naturalistic method, this research was carried out in a natural environment. The aim of this research is to solve the difficulties of students' mathematical problem solving abilities in solving problems related to the material of systems of linear equations in two variables. Researchers will explain the difficulties students face in solving questions related to this subject (Taufiq, 2022).

This research will be conducted at MTs. Private Al-Ittihad Aeknabara is located at Jalan Ahmad Yani No.20, Bilah Hulu District, LabuhanBatu Regency, North Sumatra Province.

The implementation time of this research is planned for the odd semester of 2023/2024. This predetermined time allows researchers to observe and evaluate the learning process directly, as well as conduct tests to measure students' mathematical representation skills before and after learning.

By setting a clear place and time of research, it is hoped that the results of this study can provide valid and relevant data about the Mathematical Representation Ability of Students in Solving Story Problems on SPLDV Material.

Subject
The subjects in this study were VIII grade students in one of the MTs located in Bilah Hulu sub-district, Labuhanbatu district which was randomly selected with a total of 25 students.

Instruments
The main instrument in this research is "researcher". The instrument used is a test and the data collection techniques in this study are tests and documentation. Observation is used to obtain information about the implementation of the learning process during the SPLDV material. Tests were used to obtain data on students' mathematical representations in solving SPLDV problems. The form of test used in this research is a description question (essay) because it can make it easier to identify the problems that are the focus of research. The description test consists of 3 questions about the System of Linear Equations of Two Variables (SPLDV) which are based on indicators of mathematical representation ability. While documentation was used to obtain a list of student names, written test results, and photos of the research implementation (Mathematics, 2018) .

Data Analysis Technique
Divided into 3 question items in the research instrument, namely the description of SPLDV material, is the way the data is collected. After the data is obtained, it will be explained in various stages starting from data reduction, data presentation and conclusion drawing. Data will be analyzed in various stages after it is obtained. This starts with data reduction, data collection, and conclusion drawing. Test scores will be classified into various categories, starting from the highest to the lowest, according to the standards that have been set (Muthianisa et al., 2022).

Table 1. Criteria for Mathematical Representation Ability Category

Category	Value Criteria
High	$x > \bar{x} + s$
Medium	$(\bar{x} - s) \leq x \leq (\bar{x} + s)$
Low	$x < (\bar{x} + s)$

3. Result and Discussion

Results
In this study, students were given three problems to solve independently. Furthermore, the results of the test were evaluated to find out how far the students' ability to solve them. The results of this analysis will be included in the assessment, which will ultimately produce the results of testing students' mathematical representation skills, as shown in the following table.

Table 2. Test Results of Mathematical Representation Ability of Class VIII Students

Number of Students	Highest score	Lowest score	Average	Standard Deviation
25	86	30	52,44	10,27

As shown by the test results of students' ability to point out problems in achieving the school's KKM limit at grade VIII level, which is 70. Students get the highest score of 86 and the lowest score of 30. Students get an average score of 52,44 or the overall score of students in the study, with a standard deviation of 10,27. This shows that students are still found who have not reached the school's set KKM. Students in class VIII have poor mathematical representation skills, which means they cannot solve mathematical representation problems in SPLDV material.

| Category	Assessment	Number of students	Percentage
High	$X > 72,26$	2	8%
Medium	$31,62 \leq x \leq 72,26$	13	52%
Low	$X < 32,62$	10	40%
	TOTAL	25	100%

Discussion

Based on the calculation results above, the researcher will explain the students' answers. Representation ability is the way students solve math problems using symbols, visual and verbal. The researcher gave a written test with three indicators. analysis of students' mathematical representation ability is discussed as follows.

Mathematical Representation Ability of High Category Students

1. The admission price for adults in a playground is Rp. 25,000 and for children is Rp. 15,000. On Sunday, 200 tickets were sold with a total revenue of Rp. 4,200,000. How many adult and children tickets were sold?
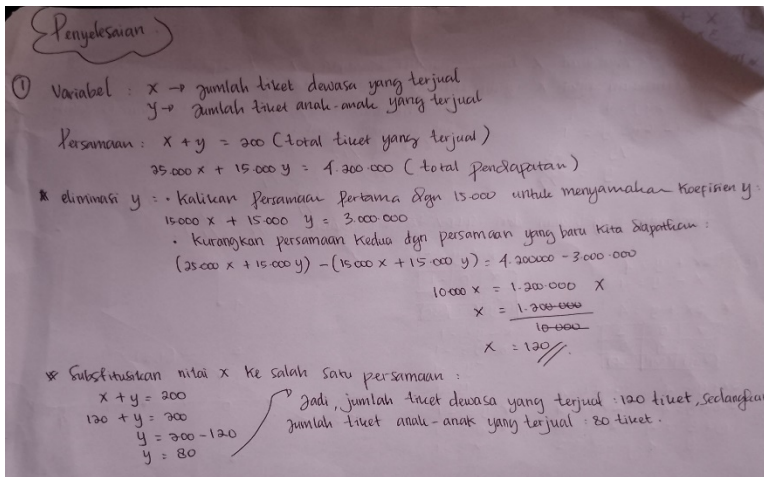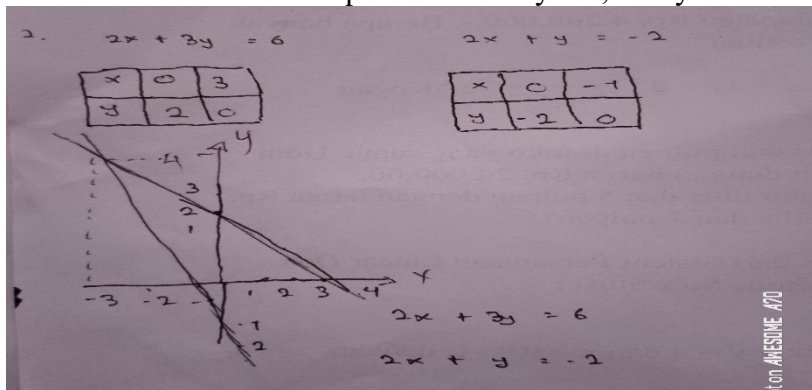
In question number 1 of the student representation ability test with verbal representation indicators. In this question students are expected to be able to explain the strategies in the problem. It can be seen from picture number 1 above that the results of students' answers to questions with indicators of utilizing words or written text are quite good because students can write complete solution steps.

Mathematical Representation Ability of High Category Students

2. Determine the set of equations $2x + 3y = 6$, $2x + y = -2$ using the graph method?

In question number 2, the test of students' mathematical representation skills with visual representation indicators. In this question students are expected to have the ability to determine the solution set of the SPLDV presented and also make a graph of the known equation. From picture number 2 the student is able to make a table of the equation $2x + 3y = 6$ and the equation $2x + y = -2$ by making the help points of the two equations.

Mathematical Representation Ability of Category Student

3. Determine the solution set of the following Two-Variable Linear Equation System using the elimination method?


In figure 3 , the answers of moderate category students, namely students have been able to solve problems in the symbolic representation indicator. This student managed to get good results but in the picture above it is incomplete, only the elimination of variable y is done by the student.

Mathematical Representation of low Category Students

4. Determine the set of equations $2x + 3y = 6$, $2x + y = -2$ can e generated using graphical methods?
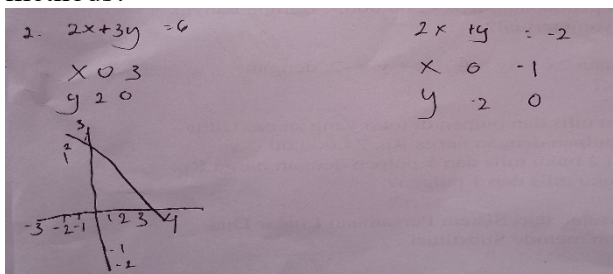
In figure no 4, the student is categorized as low, that is, the student has not been able lo draw a complete graph. Judging from the results of the student's answer, the student did not make a detailed answer drawing on the problem.

5. The admission price for adults in a playground is Rp. 25,000 and for children is Rp. 15,000. On Sunday, 200 tickets were sold with a total revenue of Rp. 4,200,000. How many adult and children tickets were sold?

In Figure 5, we can see the answers of moderate category students, namely students are able to solve problems in the verbal representation indicator. Students obtain the correct value, namely the number of adult tickets is 120 tickets and children's tickets are 80 tickets. But from the answer above, it is still lacking in detail in explaining the verbal representation problem. So this student's answer is in the low category.

4. Conclusion

Based on the results of the analysis above, it can be concluded that the subject still experiences difficulties in understanding ideas, applying skills. Not only do students experience difficulty in solving math story prolems, but also students with high and moderate math abilities. This research specifically focuses on students' ability to translate math story problems related to the system of linear equations of two variables (SPLDV) into mathematical form. This research can identify the difficulties that students often face in solving SPLDV story problems, such as difficulties in understanding the problem, choosing the right variables or composing the correct equation. Students with moderate mathematical ability category have not been able to fulfill the indicators of image, visual and verbal representation ability as a whole.
As a result of student's results in applying the principles of solving mathematical problems in the material on systems of linear equations in two variables and lack of skills to recheck answers and students fail to complete the steps in solving problems.

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